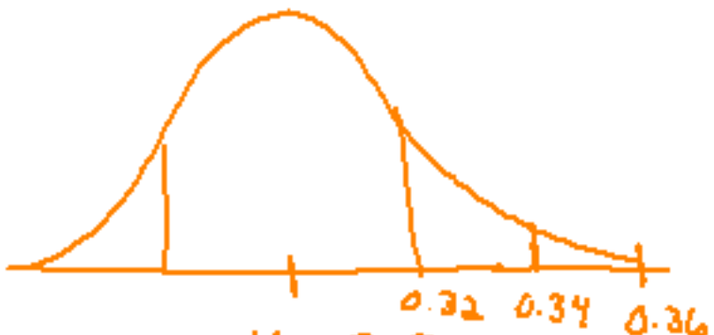
CH.1

$\hat{p}$

a) $P(\hat{p} \geq 0.5)$

=normcdf(0.5, ε99, 0.3, 0.023)



$\mu = 0.3$

$\sigma = 0.023$

b) $P(\hat{p} < 0.25)$

normcdf(−ε99, 0.25, 0.3, 0.023)

c) $P(0.25 < \hat{p} < 0.35)$

4.4 Expected Value

$0.78 ± $0.12

$1.10

* average

Exp. Value ← large # trials

Basically... long run average for each trial.

Also called the mean of a random variable

Symbols: $E(x)$ = expected value of X

theoretical → μ_X = mean of X } same

X	X_1	X_2	....	X_n
$P(X)$	$P(X_1)$	$P(X_2)$	...	$P(X_n)$

$$E(X) = \mu_X = \sum (X_i)(P(X_i))$$

$$= \{X_1 \cdot P(X_1) + X_2 \cdot P(X_2) + \dots \quad X_n \cdot P(X_n)$$

Example: $\mu_X = E(X) = (0 \cdot 0.05) + (1 \cdot 0.12) + \dots + (5 \cdot 0.05)$

$$= 2.93$$

wksht #1, 2, 4

①

x	60,000	45,000	15,000
P(x)	1/2	1/3	1/6

$E(x) = \mu_x = 47,500$

$\sigma_x = 16007.811$

variance = $\sigma_x^2 = 256,250,013$

(a)

X	-1	$74,999$
$P(x)$	0.9999	0.0001

$E(x) = \mu_X = \$6.50$

$\sigma_X = \$749.96$

(3) A

X	P(x)
250,000	0.1
-10,000	0.9

$\mu_X = 16,000$

$\sigma_X = 78,000$

B

X	P(x)
40,000	0.5
-2,000	0.5

$\mu_X = 19,000$

$\sigma_X = 21,000$

C

X	P(x)
800,000	0.05
-20,000	0.95

$\mu_X = 21,000$

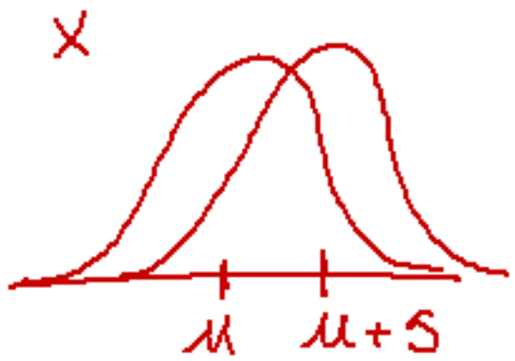
$\sigma_X = 178,714.86$

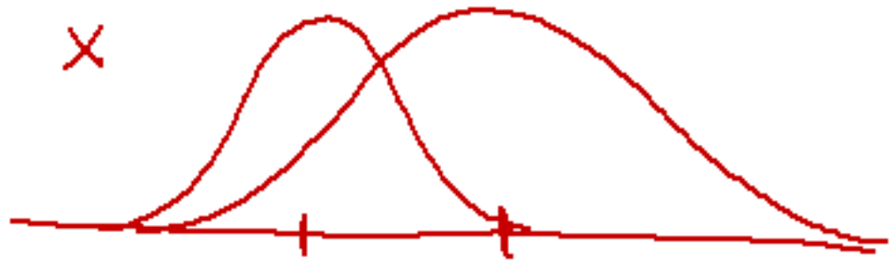
σ_X μ_X = mean of X

σ_Y μ_Y = mean of rand. var Y

RULE:

$$\mu_{a+bX} = a + b \cdot \mu_X$$





RULE:

$$\mu_{X+Y} = \mu_X + \mu_Y$$

$$\mu_{X-Y} = \mu_X - \mu_Y$$

Ex:

① $\mu_X = 6.2$

$$\mu_{\frac{1}{12}X+3} = \frac{1}{12}\mu_X + 3 = \frac{1}{12}(6.2)+3 = \boxed{3.52}$$

② $\mu_Y = 3.4$

$$\mu_{X+Y} = \mu_X + \mu_Y$$

$$= 6.2 + 3.4$$

$$= 9.6$$

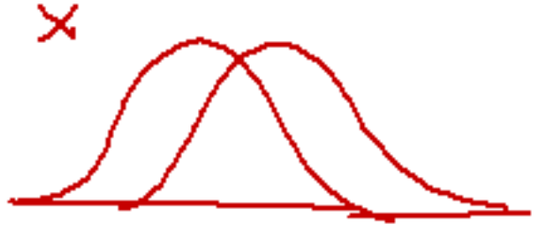
Std. Dev.

Note:

- Variance = $(\text{std. dev.})^2 = \sigma^2$
- Always work in VARIANCES (@ end take $\sqrt{\ }$ to get σ)

RULE:

$$\sigma^2_{a+bX} = \sigma^2_{bX} = b^2\sigma^2_X$$



RULE:

$$\sigma^2_{X+Y} = \sigma^2_X + \sigma^2_Y$$

equal σ^2_{X-Y}

$$\sigma_{X+Y} \neq \sigma_X + \sigma_Y$$

$\sigma_x = 3.1 \quad \sigma_x^2 = 9.61$

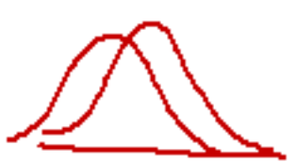
$\sigma_y = 1.4 \quad \sigma_y^2 = 1.96$

$\sigma_{x+y} \Rightarrow \sigma_{x+y}^2 = \sigma_x^2 + \sigma_y^2 = 9.61 + 1.96 = 11.57 = 3.401$

$\sigma_{x-y} \Rightarrow \sigma_{x-y}^2 = \sigma_{x+y}^2 = 3.401$

$\sigma_{2x+3} \Rightarrow \sigma_{2x+3}^2 = 2^2 \sigma_x^2 = 4(9.61) = \sqrt{38.44} = 6.2$

$\sigma_{3x+y-4} = \sigma_{3x+y}^2 = \sigma_{3x}^2 + \sigma_y^2 = 3^2 \sigma_x^2 + \sigma_y^2 = \sqrt{88.45} = 9.405$



wksht
#1-3